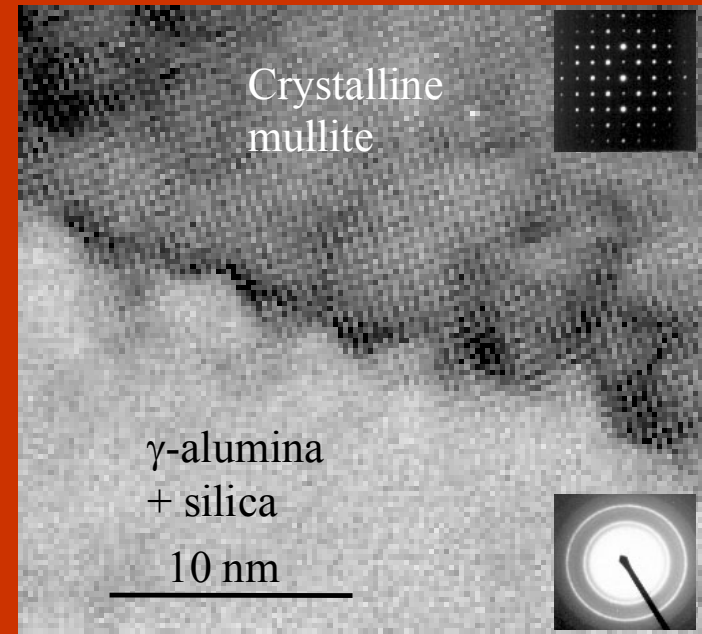


FRG: Functionally Graded High-Al Mullite Environmental Barrier Coatings

PI Soumendra Basu, Boston University, DMR-0233952

Environmental barrier mullite coatings have been deposited at different gas phase compositions ($\text{AlCl}_3/\text{SiCl}_3$) and the growth rate, composition and microstructure of the coatings have been characterized (see Figure). The effect of changing the total metal chloride ($\text{AlCl}_3+\text{SiCl}_4$) flow rate on the coating growth rate and microstructure has also been explored. The effect of step changes in the gas phase composition is currently being studied.



Photoacoustic and photothermal microscopy allow for ultra-high resolution measurement of thermal and mechanical properties are being used for spatially resolved measurements in functionally graded materials. An adaptive, holographic interferometry system is under development which will allow for ultrasound scanning and imaging, on specimens with high surface roughness and eliminate the need for surface preparation prior to inspection. Algorithms are under development to extract depth dependent thermal and mechanical property information from the measured thermal and ultrasonic wave fields.

FRG: Functionally Graded High-Al Mullite Environmental Barrier Coatings

PI Soumendra Basu, Boston University, DMR-0233952

Outreach and Education

Four graduate students and one post-doc have contributed to this work. In addition two REU students have been supported this summer, working on fluid flow and thermodynamic simulations as well as assisting in CVD growth and characterization. The research team will be presenting several papers at the International Conference on the Science of Hard Materials (ICSHM 2004) this Fall.

The PI's organized a "Science Saturday" event at Boston University in which local high school students visited our labs. Several hands on demonstrations were developed, and the students explored several aspects of Nondestructive Testing including ultrasonic imaging using a medical ultrasound imaging system, crack detection using a piezoelectric transducer, and vibration sensing using a Michelson Interferometer (see Figures). In addition, the students were introduced to new materials systems and techniques used to tailor material properties for specific applications.

